6/17/03
#10/Dec.

DOCKET NO.: 206228US0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:	
SATOSHI NITYAMA, ET AL.	:	EXAMINER: HUFF, M.
SERIAL NO: 09/807,425	:	
FILED: JULY 3, 2001	:	GROUP ART UNIT: 1756
FOR: LIQUID CRYSTAL OPTICAL ELEMENT AND METHOD FOR ITS PRODUCTION	:	

DECLARATION UNDER 37 C.F.R. § 1.132

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Now comes Shinya Tahara, who deposes and states that:

1. I am a Senior Engineer in the Electric Technology Development Center.

2. I have been employed by Asahi Glass Co., since 1992, and I have been conducting research in the field of liquid crystal optical element for 11years.

3. I am familiar with the method for producing a liquid crystal optical element claimed in U.S. Application Serial No. 09/807,425.

4. Some of the monomer materials (compounds) of formula (1) disclosed in the specification of the 09/807,425 application are non-liquid crystalline.

5. In order to demonstrate that the monomer material C6H disclosed in Hikmet et al (U.S. 5,188,760) is a liquid crystalline material the following experiments were carried by me or under by direct supervision and control. The C6H material is disclosed in the Example of the Hikmet patent. The formula is provided in corresponding EP 0451905 B1 as:

CH_2=CH-C(O)O-$(CH_2)_6$-O-Ph-C(O)O-Ph-OC(O)-Ph-O-$(CH_2)_6$-OC(O)-CH=CH_2.

Experiment 1 C6H (Hikmet)

Small amount of polymerizable compound 1 (lot.990216) was put on a glass plate with a small spoon and the plate was set in a hot stage (FP-82) with a microscope (BH-2) for polarizing microscopic observation. The stage temperature was controlled by a temperature controller (Mettler FP-90). The stage was heated from 50°C to 160°C at a rate of 5°C/min to observe texture change or melting of crystal. The polarizer and the analyzer of the microscope was set to cross nicol position. Below 109°C the compound showed crystal state, and above 109°C it showed nematic liquid crystal, which was identified by its Schlieren texture.

6. In order to demonstrate that the monomer BP(C2)DA is inherently non-liquid crystalline the following experiments were carried by me or under by direct supervision and control. The monomer BP(C2)DA is the monomer of formula (4) in the present specification and has the following chemical formula:

CH_2=CH-C(O)O-$(CH_2)_2$-O-Ph-Ph-O-$(CH_2)_2$-OC(O)-CH=CH_2

*Ph = 1,4-phenylene group.

Experiment 2 BP(C2)DA (Present Invention)

Small amount of polymerizable compound 2 (lot.100625) was put on a glass plate with a small spoon and the plate was set in a hot stage (FP-82) with a microscope (BH-2) for polarizing microscopic observation. The stage temperature was controlled by a temperature controller (Mettler FP-90). The stage was heated from 50°C to 100°C at a rate of 5°C/min to observe texture change or melting of crystal. The polarizer and the analyzer of the microscope was set to cross nicol position. Below 97°C the compound showed crystal state, and above 97°C it showed isotropic liquid state. Then the stage was cooled from 100°C to

50°C at a rate of 5°C/min. Above 78°C it showed isotropic liquid state, and below 78°C it showed crystal state. Accordingly, the compound showed no liquid crystal state.

7. In order to demonstrate that the monomer BP(C6)DA is inherently non-liquid crystalline the following experiments were carried by me or under by direct supervision and control. The monomer BP(C6)DA is a monomer of formula (1) in the present specification and has the following chemical formula:

CH_2=CH-C(O)O-$(CH_2)_6$-O-Ph-Ph-O-$(CH_2)_6$-OC(O)-CH=CH_2

*Ph = 1,4-phenylene group.

Experiment 3 BP(C6)DA

Small amount of polymerizable compound 3 (lot.030217) was put on a glass plate with a small spoon and the plate was set in a hot stage (FP-82) with a microscope (BH-2) for polarizing microscopic observation. The stage temperature was controlled by a temperature controller (Mettler FP-90). The stage was heated from 50℃ to 85℃ at a rate of 5℃/min to observe texture change or melting of crystal. The polarizer and the analyzer of the microscope were set in cross nicol position. Below 78℃ the compound showed crystal state, and above 84℃ it showed isotropic liquid state. Between 78 and 84℃ the crystal state changed into isotropic liquid. Then the stage was cooled from 80℃ to 70℃ at a rate of 5℃ /min. Above 73℃ it showed isotropic liquid state, and below 73℃ it showed crystal state. Accordingly, the compound showed no liquid crystal state.

8. In order to demonstrate that the monomer BP(PO1)DA is inherently non-liquid crystalline the following experiments were carried by me or under by direct supervision and control. The monomer BP(PO1)DA is the monomer of formula (5) in the present specification and has the following chemical formula:

CH_2=CH-C(O)O-CH(CH_3)CH_2-O-Ph-Ph-O-CH_2CH(CH_3)-OC(O)-CH=CH_2

*Ph = 1,4-phenylene group.

Experiment 4 BP(PO1)DA

Small amount of polymerizable compound 4 (lot.100930) was put on a glass plate with a small spoon and the plate was set in a hot stage (FP-82) with a microscope (BH-2) for polarizing microscopic observation. The stage temperature was controlled by a temperature controller (Mettler FP-90). The stage was heated from 50℃ to 75℃ at a rate of 5℃/min to observe texture change or melting of crystal. The polarizer and the analyzer of the microscope were set in cross nicol position. Below 55℃ the compound showed crystal state, and above 72℃ it showed isotropic liquid state. Between 55 and 72℃ the crystal state gradually changed into isotropic liquid. Then the stage was cooled from 35℃ to 15℃ at a rate of 4℃/min. Above 26℃ it showed isotropic liquid state, and below 19℃ it showed crystal state. Between 19 and 26℃ the compound gradually crystallized. Accordingly, the compound showed no liquid crystal state.

9. In order to demonstrate that the monomer BP(EO3)DA is inherently non-liquid crystalline the following experiments were carried by me or under by direct supervision and control. The monomer BP(EO3)DA is the monomer of formula (6) in the present specification and has the following chemical formula:

CH_2=CH-CO-$(OCH_2CH_2)_3$-O-Ph-Ph-O-$(CH_2CH_2O)_3$-CO-CH=CH_2

*Ph = 1,4-phenylene group.

Experiment 5 BP(EO3)DA

Small amount of polymerizable compound 5 (lot.100713) was put on a glass plate with a small spoon and the plate was set in a hot stage (FP-82) with a microscope (BH-2) for

polarizing microscopic observation. The stage temperature was controlled by a temperature controller (Mettler FP-90). The stage was heated from 100℃ to 120℃ at a rate of 5℃/min to observe texture change or melting of crystal. The polarizer and the analyzer of the microscope were set in cross nicol position. Below 106℃ the compound showed crystal state, and above 113℃ it showed isotropic liquid state. Between 106 and 113℃ the crystal state changed into isotropic liquid. Then the stage was cooled from 85℃ to 65℃ at a rate of 5℃ /min. Above 76℃ it showed isotropic liquid state, and below 76℃ it showed crystal state. Accordingly, the compound showed no liquid crystal state.

10. The experimental procedure carried out to determine the liquid crystalline characteristics of the above monomers is recognized in the art and provides statistically significant results.

11. The undersigned Declarant declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made, are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing therein.

Date: June 10, 2003

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Shinya Tahara